Anthrax

(Also known as Woolsorter Disease)

Report Immediately

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1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Anthrax is a disease caused by the bacterium *Bacillus anthracis*. It is primarily a disease of wild and domestic animals.

B. Clinical Description

Anthrax is an acute bacterial disease which usually involves the skin, but may involve the upper throat, lower respiratory tract, chest cavity or intestinal tract. The tissue and organ damage associated with anthrax are caused by toxins produced by the bacteria.

In anthrax affecting the skin (cutaneous anthrax), itching of an exposed skin surface occurs first. Itching is followed by a small red lesion that progresses to a blister and, ultimately, a scabbed ulcer (eschar) with significant surrounding edema. Roughly 5% to 20% of people with untreated cutaneous anthrax die, although prompt treatment with effective antibiotics can reduce the risk to minimal.

Initial symptoms of anthrax of the lower respiratory tract (inhalation anthrax) are usually mild, resembling an upper respiratory infection. Severe symptoms follow within 3 to 5 days, and include respiratory distress, fever and shock, with death following shortly. X-ray findings typically show a widened mediastinum. Hemorrhagic mediastinitis and/or meningitis are frequent severe complications. Treatment rarely prevents death once the severe symptoms begin. The case-fatality rate for inhalation anthrax is 85–100%.

Intestinal anthrax is rare and tends to occur in foodborne outbreaks. Fever, blood infection and death typically follow abdominal pain. Even with treatment, the case-fatality rate for intestinal anthrax can approach 50%.

A form of anthrax affecting the upper throat (oropharyngeal anthrax) has been described.

C. Reservoirs

Wild and domestic hoofed herbivores (plant-eating animals), including livestock, are the reservoir of multiplying organisms. When exposed to the environment, the organisms produce spores. Spores, which are very resistant to disinfection and adverse environmental conditions, are capable of surviving in soil for decades. Skins and hides of infected animals may harbor the spores for years. Worldwide spread of anthrax occurs primarily through dissemination of contaminated skins and hides.

D. Modes of Transmission

Cutaneous infection occurs through: 1) contact with contaminated skins, wool or hides, or products made from these; 2) contact with tissues of animals that are clinically ill or dead from anthrax; 3) contact with soil contaminated with spores or contaminated bonemeal used in gardening; or, 4) rarely, bites by insects that have bitten infected animals or humans. Inhalation anthrax occurs through inhalation of spores, particularly in environments related to processing of animal hides and wool. It may also occur in association with accidental

or intentional aerosolization of spores, as may occur with a laboratory accident or bioterrorist event. Intestinal and oropharyngeal anthrax occurs through ingestion of undercooked contaminated meat.

E. Incubation Period

The incubation period for anthrax is usually 1 to 7 days, and most cases occur within 2 days of exposure. However, incubation periods of up to 60 days have been reported.

F. Period of Communicability or Infectious Period

Person-to-person transmission has not been documented. Products and soil contaminated with spores may remain infectious for decades.

G. Epidemiology

Anthrax is primarily a disease of wild and domestic herbivorous (plant-eating) animals. Unaffected herds of livestock may be exposed through feed containing contaminated bonemeal. Anthrax is an infrequent cause of disease in the United States but a sporadic cause of disease in most industrialized countries. Massachusetts has not had a case of anthrax acquired in the state since 1967. Anthrax in animals is common in Central and South America, southern and eastern Europe, Africa and Asia. Persons at greatest risk of contracting anthrax are those whose occupations may expose them to contaminated meat, hides or wool. Veterinarians and others who handle and treat infected animals are also at risk.

H. Bioterrorist Potential

Bacillus anthracis is considered a potential bioterrorist agent. If acquired and properly disseminated, *Bacillus anthracis* could cause a serious public health challenge in terms of ability to limit the numbers of casualties and control other repercussions from such an attack.

2) REPORTING CRITERIA AND LABORATORY TESTING SERVICES

A. What to Report to the Massachusetts Department of Public Health

- Report any suspicion of anthrax called to your attention by a healthcare provider or any positive laboratory result pertaining to anthrax. (A case with widened mediastinum and/or hemorrhagic mediastinitis with or without presumptive or confirmatory laboratory results is a suspect case.) Also report any other communications received from anonymous sources which might be anthrax caused by bioterrorism (*e.g.*, letter, mail, phone threat).

Note: See Section 3) C below for information on how to report a case.

B. Laboratory Testing Services Available

The State Laboratory Institute (SLI) provides services for testing clinical specimens for *B. anthracis*. Healthcare providers can send specimens (blood, tissue biopsies, discharge fluid, vesicle fluid, etc.) to the Reference Laboratory at the SLI. Isolates submitted from other laboratories will also be confirmed and/or identified. Additionally, the Reference Laboratory requests that all laboratories submit all isolates cultured for further identification to aid in the public health surveillance necessary for this illness. The Reference Laboratory needs to be notified before samples are submitted. For more information on submitting samples, contact the Reference Laboratory at (617) 983-6607.

3) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To identify potential sources of transmission in the United States (*e.g.,* imported wool, livestock, or soil), and to stop transmission from such sources.

- To identify sources of transmission and geographical areas of risk outside the United States and to stop transmission from such sources.
- To identify human and animal cases as early as possible to prevent transmission to other persons or animals, either through direct contact (unlikely) or through spores that form in carcasses of dead animals.
- To identify cases and clusters of human illness that may be associated with a bioterrorist event.

B. Laboratory and Healthcare Provider Reporting Requirements

Please refer to the lists of reportable diseases (at the end of this manual's introductory section) for specific information.

Note: Due to the rarity, potential severity, and primarily imported nature of anthrax, the Massachusetts Department of Public Health (MDPH) requests that information about any suspect or known case of anthrax be **immediately reported** to the local board of health where diagnosed. If this is not possible, call the MDPH Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 (weekdays), or (617) 983-6200 (emergency number for nights/weekends). A case of anthrax is defined by the reporting criteria in Section 2) A above.

C. Local Board of Health Responsibilities

1. **Reporting Requirements**
   MDPH regulations (*105 CMR 300.000*) stipulate that each local board of health (LBOH) must report any case of anthrax (as defined by the reporting criteria in Section 2A above). Please refer to the *Local Board of Health Reporting Timeline* (at the end of this manual's introductory section) for information on prioritization and timeliness requirements of reporting and case investigation.

2. **Case Investigation**
   a. **The most important thing a LBOH can do upon learning of a suspect or confirmed case of anthrax, or potential exposure to anthrax, is to call the MDPH Division of Epidemiology and Immunization immediately, any time of the day or night.** Daytime phone numbers for the Division are (617) 983-6800 or (888) 658-2850. The emergency phone number for nights and weekends is (617) 983-6200.

   b. Case investigation of anthrax in Massachusetts residents will be directed by the MDPH Division of Epidemiology and Immunization. If a bioterrorist event is suspected, the MDPH and other response authorities will work closely with LBOHs and provide instructions/information on how to proceed.

   c. Following immediate notification of the MDPH, the LBOH may be asked to assist in investigating cases that live within their communities, including gathering the following:
      1) The case's name, age, address, phone number, status (hospitalized, at home, deceased), and parent/guardian information, if applicable.
      2) The name and phone number of the hospital where the case is or was hospitalized.
      3) The name and phone number of the case's attending physician.
      4) The name and phone number of the infection control official at the hospital.
      5) If the patient was seen by a healthcare provider before hospitalization, or seen at more than one hospital, be sure to document these names and phone numbers as well.

   d. Following immediate notification of the MDPH, the LBOH may be asked to assist in completing an official MDPH *Anthrax Case Report* form (in Appendix A). Most of the information required on the form can be obtained from the provider or the medical record. Use the following guidelines to assist you in completing the form.
      1) Accurately record demographic information.
      2) Record whether the case was intestinal anthrax, inhalation anthrax, cutaneous anthrax, septicemic anthrax, or a combination of these forms of anthrax.

3) Be sure to record date and time of the onset of illness, symptom information, patient status (*e.g.*, recovered, died) accurately.
4) Exposure history: use the longest incubation period for anthrax (1 to 60 days). Specifically, focus on the period beginning a minimum of 1 day prior to the case's onset date back to no more than 60 days before onset for the following exposures:
   a) Travel history: Determine the date(s) and geographic area(s) traveled to by the case to identify where the patient may have become infected.
   b) Animals/animal products: For cutaneous or inhalation anthrax, ask about exposures to animals and/or animal products.
   c) Meat consumed: For intestinal or oropharyngeal anthrax, ask about sources of meat consumed.
   d) Laboratory exposure: Determine whether the case works in a laboratory.
5) If you have made several attempts to obtain case information, but have been unsuccessful (*e.g.*, the case or healthcare provider does not return your calls or respond to a letter, or the case refuses to divulge information or is too ill to be interviewed), please fill out the form with as much information as you have gathered. Please note on the form the reason why it could not be filled out completely.

e. After completing the form, attach lab report(s) and fax or mail (in an envelope marked "Confidential") to the MDPH Division of Epidemiology and Immunization, Surveillance Program. The confidential fax number is (617) 983-6813. Call the Surveillance Program at (617) 983-6801 to confirm receipt of your fax. The mailing address is:

   MDPH, Division of Epidemiology and Immunization
   Surveillance Program, Room 241
   305 South Street
   Jamaica Plain, MA 02130

f. Institution of disease control measures is an integral part of case investigation. It is the LBOH responsibility to understand, and, if necessary, institute the control guidelines listed below in Section 4), Controlling Further Spread.

4) CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements (*105 CMR 300.200*)

Minimum Period of Isolation of Patient
Until lesions are healed or free of anthrax bacilli.

Minimum Period of Quarantine of Contacts
No restrictions.

B. Protection of Contacts of a Case

There is no immunization or prophylaxis for contacts of cases. Standard precautions for cases are recommended. Contaminated dressings and bedclothes of cases should be burned or steam sterilized to destroy spores.

C. Managing Special Situations

Reported Incidence Is Higher than Usual/Outbreak Suspected
If any cases of anthrax occur in individuals in your city/town, or if you suspect an outbreak, investigate to determine the source of infection and mode of transmission. A common vehicle, such as a wool factory, should be sought and applicable preventive or control measures should be instituted. Consult with the Division of Epidemiology and Immunization at (617) 983-6800 or (888) 658-2850 as soon as possible. The Division can

help determine a course of action to prevent further cases and can perform surveillance for cases that may cross town lines and therefore be difficult to identify at a local level.

Note: Refer to the MDPH's *Foodborne Illness Investigation and Control Reference Manual* for comprehensive information on investigating foodborne illness complaints and outbreaks. (Copies of this manual were distributed to local boards of health in 1997–98. It can also be located on the MDPH website in PDF format at <http://www.magnet.state.ma.us/dph/fpp/refman.htm>.) For recent changes (fall of 2000) to the Massachusetts Food Code, contact the Division of Food and Drugs, Food Protection Program at (617) 983-6712 or through the MDPH website at <http://www.state.ma.us/dph/fpp/>.

Note: For a potential bioterrorist event, the MDPH and other response authorities will work closely with local boards of health and provide instructions/information on how to proceed.

D. Preventive Measures

Environmental Measures

Implicated food items must be removed from the environment. A decision about testing implicated food items can be made in consultation with the Division of Food and Drugs (DFD) or the Division of Epidemiology and Immunization. Coordination for pickup and testing of food samples can be done through the DFD. If a commercial product is suspected, DFD will also coordinate follow-up with relevant outside agencies.

Personal Preventive Measures/Education

To avoid cases of anthrax, the MDPH recommends the following:

- Individuals at significant, continuing risk of acquiring anthrax (*e.g.*, laboratory workers) be vaccinated.
- Employees who work with hides of potentially infected animals should be educated about anthrax and how to minimize exposures.

ADDITIONAL INFORMATION

The following is the formal Centers for Disease Control and Prevention (CDC) surveillance case definition for anthrax. It is provided for your information only and should not affect the investigation or reporting of a case that fulfills the criteria in Section 2) A of this chapter. (CDC case definitions are used by the state health department and CDC to maintain uniform standards for national reporting.) For reporting a case to the MDPH always use the criteria outlined in Section 2) A.

Clinical Description

An illness with acute onset characterized by several distinct clinical forms, including the following:

- Cutaneous: a skin lesion evolving during a period of 2–6 days from a papule, through a vesicular stage, to a depressed black eschar.
- Inhalation: a brief prodrome resembling a viral respiratory illness, followed by development of hypoxia and dyspnea, with radiographic evidence of mediastinal widening.
- Intestinal: severe abdominal lesion in the oral cavity or oropharynx, cervical adenopathy and edema, and fever.

Laboratory criteria for diagnosis

- Isolation of *Bacillus anthracis* from a clinical specimen, or
- Anthrax electrophoretic immunotransblot (EITB) reaction to the protective antigen and/or lethal factor bands in one or more serum samples obtained after onset of symptoms, or
- Demonstration of *B. anthracis* in a clinical specimen by immunofluorescence.

Case classification

Confirmed: a clinically compatible case that is laboratory confirmed.

REFERENCES

American Academy of Pediatrics. *1997 Red Book: Report of the Committee on Infectious Diseases, 24th Edition.* Illinois, American Academy of Pediatrics, 1997.

Chin, J., ed., *Control of Communicable Diseases Manual, 17th Edition*. Washington, DC, American Public Health Association, 2000.

CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. 1997; 46:RR-10.

MDPH. *Regulation 105 CMR 300.000: Reportable Diseases and Isolation and Quarantine Requirements*. MDPH, Promulgated November 1998 (Printed July 1999).